Alg. 2 Warm Up #5-3

Expand:

1. $(x + 5)^2$
2. $(x - 4)^2$
3. $(x - 6)^2$

Factor:

4. $x^2 + 6x + 9$
5. $x^2 - 2x + 1$
6. $x^2 + 4x + 4$
7. $x^2 - 14x + 49$

HW Questions

Preview

2-35. Solve each of the following equations *without using the Quadratic Formula*.

a. $y^2 - 6y = 0$

b. $n^2 + 5n + 7 = 7$
$-7 \quad -7$

c. $2t^2 - 14t + 3 = 3$

d. $\frac{1}{3}x^2 + 3x - 4 = -4$

e. Zero is one of the solutions of each of the above equations. What do all of the above equations have in common that causes them to have zero as a solution?

a) $y(y-6) = 0$

$\boxed{y = 0}$

$y - 6 = 0$
$+6 \quad +6$
$\boxed{y = 6}$

$n^2 + 5n = 0$

$n(n+5) = 0$

$\boxed{N = 0}$

$n + 5 = 0$
$-5 \quad -5$
$\boxed{n = -5}$

2-36. Find the vertex of each of the following parabolas by averaging the x-intercepts. Then write each equation in graphing form.

a. $y=(x-3)(x-11)$

b. $y=(x+2)(x-6)$

c. $y=x^2-14x+40$

d. $y=(x-2)^2-1$

vertex: $(2,-1)$

$y=(x-h)^2+k$

(h,k)

2-37. Did you need to average the x-intercepts to find the vertex in part (d) of the preceding problem?

$y = (x - 2)^2 - 1$

a. What are the coordinates of the vertex for part (d)? $\rightarrow (2,-1)$

b. How do these coordinates relate to the equation?

2-38. Scientists can estimate the increase in carbon dioxide in the atmosphere by measuring increases in carbon emissions. In 1998 the annual carbon emission was about eight gigatons (a gigaton is a billion metric tons). Over the last several years, annual carbon emission has been increasing by about one percent.

$100\% + 1\% = 101\% \longrightarrow 1.01$ Multiplier.

a. At this rate, how much carbon will be emitted in 2010?

b. Write a function, $C(x)$, to represent the amount of carbon emitted in any year starting with the year 2000.

let x = years since 2000

in 1998 $\rightarrow$ 8 gigatons

1999 $\rightarrow 8(1.01) = 8.08$

2000 $\rightarrow 8.08(1.01) = 8.1608$

$C(x)=8.1608(1.01)^x$

2-39. Make predictions about how many places the graph of each equation below will touch the x-axis. You may first want to rewrite some of the equations in a more useful form.

a. $y=(x-2)(x-3)$

b. $y=(x+1)^2$

c. $y=x^2+6x+9$

d. $y=x^2+7x+10$

e. $y=x^2+6x+8$

f. $y=-x^2-4x-4$

g. Check your predictions with your calculator.

h. Write a clear explanation describing how you can tell whether the equation of a parabola will touch the x-axis at only one point.

2-40. Simplify each of the following expressions. Be sure that your answer has no negative or fractional exponents.

a. $64^{1/3}$

b. $(4x^2y^5)^{-2}$

c. $(2x^2\cdot y^{-3})(3x^{-1}y^5)$

$$\frac{2x^2}{y^3}\cdot\frac{3y^5}{x}$$

$$\frac{y^5}{y^3}=\boxed{\frac{y\cdot y\cdot y\cdot y\cdot y}{y\cdot y\cdot y}}\rightarrow \frac{6x^2y^5}{x\,y^3}$$

$$\boxed{6xy^2}$$

2-41. Suppose you have a 3 by 3 by 3 cube. It is painted on all six faces and then cut apart into 27 pieces, each a 1 by 1 by 1 cube. If one of the cubes is chosen at random, what is the probability that:

a. Three sides are painted?

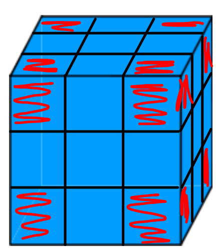
b. Two sides are painted?

c. One side is painted?

d. No sides are painted?

corner squares: 8

$$\boxed{\frac{8}{27}}$$



Yesterday's CP's: 2- #31 ---> 34

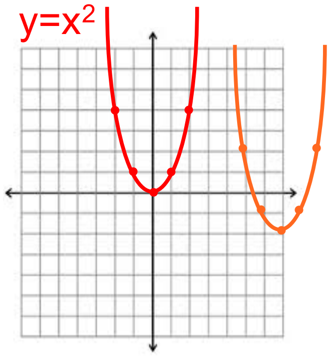
$y=a(x-h)^2+k$

2-32. Graph each equation below without making a table or using your graphing calculator. Look for ways to go directly from the equation to the graph. What information did you need to make a graph without using a table? How did you find that information from the equation? Be ready to share your strategies with the class.

a. $y=(x-7)^2-2$ Rt 7 → down 2

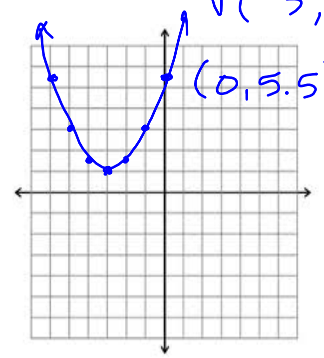
b. $y=0.5(x+3)^2+1$ vertical compression

$y=x^2$



$V(-3,1)$

$(0,5.5)$



2-33. In problem 2-32, you figured out that having an equation for a parabola in **graphing form** ($y=a(x-h)^2+k$) allows you to know the vertex, the orientation, and the stretch factor, and that knowing these attributes allows you to graph without having to make a table. How can you make a graph without a table when the equation is given in **standard form** ($y=ax^2+bx+c$)? Consider the equation $y=2x^2+4x-30$.

a. What is the orientation of $y=2x^2+4x-30$? That is, does it open upward or open downward? How could you change the equation to make the graph open the opposite way?

b. What is the stretch factor of $y=2x^2+4x-30$? Justify your answer.

c. Can you identify the vertex of $y=2x^2+4x-30$ by looking at the equation? If not, talk with your team about strategies you could use to find the vertex without using a table or graphing calculator and then apply your new strategy to the problem. If your team is stuck consider doing parts (*i*) through (*iii*) below.

(next slide)

i. What are the *x*-intercepts of the parabola?

ii. Where is the vertex located in relation to the *x*-intercepts? Can you use this relationship to find the *x* coordinate of the vertex?

iii. Use the *x*-coordinate of the vertex to find its *y*-coordinate.

d. Make a quick graph of $y=2x^2+4x-30$ and write its equation in graphing form.

$\boxed{\text{2-33}}$

part c)

i. What are the x-intercepts of the parabola? $(3,0)$ & $(-5,0)$

ii. Where is the vertex located in relation to the x-intercepts? Can you use this relationship to find the x coordinate of the vertex?

iii. Use the x-coordinate of the vertex to find its y-coordinate.

$$y = 2x^2 + 4x - 30$$

$$0 = (2x-6)(x+5)$$

$$2x - 6 = 0 \qquad x + 5 = 0$$
$$+6 \quad +6 \qquad -5 \quad -5$$
$$\frac{2x}{2} = \frac{6}{2}$$
$$x = 3, -5$$

Vertex

$$x = \frac{3-5}{2} = -1$$

$(-1,$

Review Completing the Square:

$$y = x^2 + 6x + 1$$

$$y = x^2 + 6x + \underline{9} + \underbrace{1 - \underline{9}}$$

$$y = (x+3)^2 - 8$$

$y =$ (area model) $+ \ \underline{1}$; $+9$

	x	3
3	$3x$	9
x	x^2	$3x$

$x + 3$

$$y + 9 = (x+3)^2 + 1$$
$$-9 \qquad\qquad -9$$
$$y = (x+3)^2 - 8$$

$$y = x^2 - 8x + 10$$

$$y = x^2 - 8x + \underline{16} + \underbrace{10 - \underline{16}}$$

$$y = (x-4)^2 - 6$$

CP's: 2- #42, 46, 47(skip part c) p. 71

2.1.4 How can I rewrite it in graphing form?

Rewriting in Graphing Form

In Lesson 2.1.3, you used the method of averaging the intercepts to change the equation of a parabola from the standard form $f(x)=ax^2+bx+c$ to the graphing form $f(x)=a(x-h)^2+k$ by finding the x-intercepts and averaging them to find the x-value of the vertex. Next you substituted to find the y-value, and then used the coordinates of the vertex for h and k.

What can you say about a parabola that cannot be factored or that does not cross the x-axis? How can you write its equation in graphing form? In a previous course you may have learned how to complete the square for quadratics and this strategy can help you write the graphing form for a parabola.

2-42. In this investigation you will compare two methods of changing a quadratic equation from standard form to graphing form.

a. Write the equation of the parabola $y=x^2-2x-15$ in graphing form using two methods. First, use the method of averaging the intercepts. Then, use the method of completing the square. Find the x-intercept(s), the y-intercept(s), and the vertex of the parabola, and sketch the graph.

b. Write $y=x^2+8x+10$ in graphing form. Find the intercepts and vertex, and sketch the graph. Do both strategies work for this parabola?

c. Can you use both methods to sketch $y=x^2+2x+4$? Do both strategies still work?

d. Discuss the two strategies with your team. Then respond to the following Discussion Points.

Discussion Points

When does the method of averaging the intercepts work better?

When does the method of completing the square work better?

Which method was more efficient and why?

2-46. Use the strategy of your choice to write each function below in graphing form.

a. $f(x)=x^2+6x+7$

b. $f(x)=x^2-4x+11$

c. $f(x)=x^2+5x+2$

d. $f(x)=x^2-7x+2$

Show your process for part b and skip part c

2-47. How can you use a quadratic equation in graphing form to make a quick sketch of the parabola?

a. What is the vertex and y-intercept of the graph of $y=(x-3)^2-25$? Explain how you found the y-intercept.

b. Find the x intercepts of $y=(x-3)^2-25$ algebraically. Explain how you found the x-intercepts.

~~c.~~ Obtain the Lesson 2.1.4 Resource Page and justify each step in solving the equation in part (b) for x when $y=0$.

d. Find the exact vertex, y-intercept, and x-intercepts of $y=(x+5)^2-8=0$. Make a sketch of the parabola, then check your sketch with your graphing calculator.

HW: 2- # 50 ---> 56

finish this week's classwork:
Warm up
2- #11, 13, 14
2- #31 --->34
2- #42, 46, 47

Tomorrow's Quiz:

Quick Line Graph from Ax + By = C
Solve for x (in denominator)
Zero product property from: $2x^3 - 8x = 0$
Simple sequence to equation